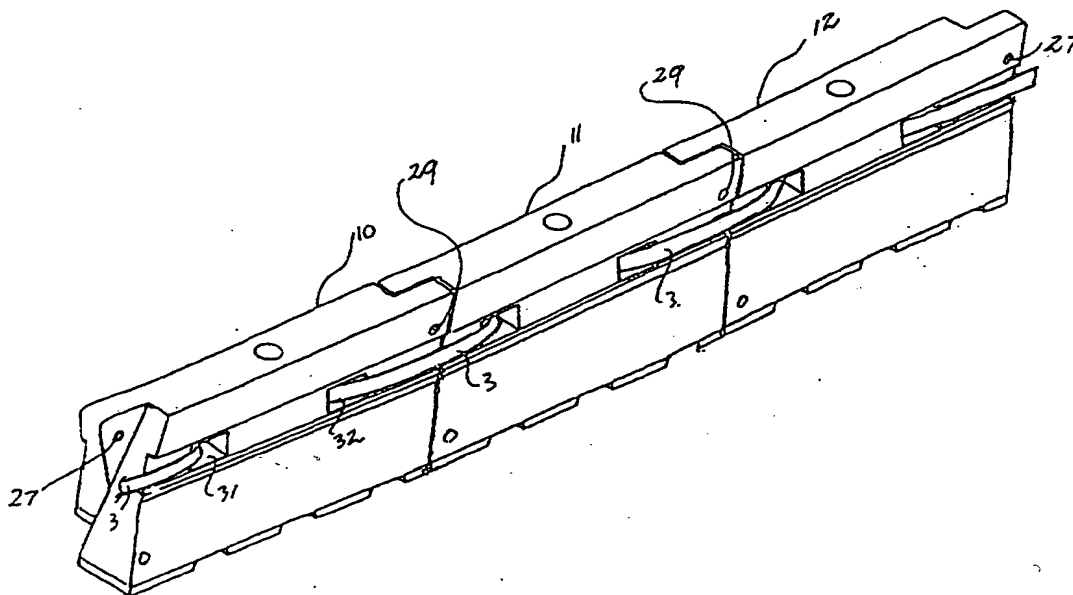


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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/AU96/00551 (22) International Filing Date: 5 September 1996 (05.09.96) (30) Priority Data: PN 5248 5 September 1995 (05.09.95) AU (71) Applicant (for all designated States except US): KINABALU INVESTMENTS PTY. LTD. [AU/AU]; Anthony Thomas & Co., Australia Square Tower, 29th floor, 264 George Street, Sydney, NSW 2000 (AU). (72) Inventor; and (75) Inventor/Applicant (for US only): ADCOCK, Robin, Noel [AU/GB]; Harbour Plaza, Suite 1240, 20 Tak Fung Street, Hung Hom, Hong-Kong (HK). (74) Agent: PIZZEYS; Trustee House, Level 6, 444 Queen Street, Brisbane, QLD 4000 (AU).		(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>

(54) Title: BARRIERS**(57) Abstract**

A barrier constructed from a plurality of hollow barrier elements (10, 11, 12) each filled with a liquid and arranged end to end. The barrier elements each comprise a body portion and one or more associated anchoring means (31, 32) and wherein linking means (33) such as a flexible line member is threaded through adjacent anchoring means so as to secure the barrier elements together to form a continuous barrier.

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"BARRIERS"

This invention relates to barriers.

This invention has particular but not exclusive application to traffic barriers and for illustrative purposes reference will be made to such application. However it is to be understood that this invention could be used in other applications such as for building panels.

The presently known traffic barriers typically include barrier elements which are linked by a plurality of pin joints or by interlocking components. Such barriers typically allow for only small relative deviation of adjacent elements from a straight line. Consequently, continuous barriers cannot be formed in many road situations. Furthermore, in many cases the means of connecting adjacent barrier elements does not adequately transmit loads such as produced by an impinging vehicle to other barrier elements.

The present invention aims to alleviate at least one of the above disadvantages and to provide a barrier which will be reliable and efficient in use.

With the foregoing in view this invention in one aspect resides broadly in a barrier including:

a plurality of linked barrier elements, each barrier element having a body portion with one or more associated anchoring means; and

linking means extending between anchoring means of adjacent barrier elements so as to secure said barrier

elements together to form a continuous barrier. Preferably the linking means is a flexible line member such as a strap or a length of chain.

5 In another aspect this invention resides broadly in a method of linking barrier elements together so as to construct a barrier, including:

providing a plurality of barrier elements having a body portion with one or more associated anchoring means;

arranging the barrier elements end to end;

10 looping linking means around adjacent anchoring means of said end to end barrier elements; and

securing the respective ends together of each of said linking means. Preferably the linking means is a flexible line member such as a strap or a length of chain.

15 In yet another aspect this invention resides broadly in a method of linking barrier elements together so as to construct a barrier, including:

providing a plurality of barrier elements having a body portion with one or more associated anchoring means;

20 arranging the barrier elements end to end;

threading linking means progressively through the anchoring means of said plurality of barrier elements; and

25 securing each of the ends of said linking means to a respective anchor. Preferably the linking means is a flexible line member such as a strap or a length of chain.

In yet another aspect this invention resides broadly in a barrier element adapted for linking to an adjacent barrier

element by linking means such as a flexible line member including:

a body portion, and

retaining means provided in said body portion or
5 attached to said body portion for retaining said linking means in operative engagement with a longitudinally extending portion of said body portion whereby said barrier elements may be linked to form a continuous barrier.

Preferably the body portion is substantially hollow and
10 is adapted to contain a liquid wherein the barrier elements may be transported to site and manoeuvred into position in an empty state and subsequently filled with water or some other suitable liquid. The term 'liquid' as used herein also encompasses flowable materials such as sand, gravel or grain.

15 Preferably the anchoring means is formed by apertures which extend through the body portion and wherein linking means such as a strap or chain may be passed through the aperture so as to encompass a part of the body portion. The linking means may be secured to itself, or to the barrier
20 element or to an anchorage such as a separate post or the like. In a preferred form of the invention apertures formed for lifting purposes suitably provide anchoring means. However, the anchoring means could also be provided by a protuberance or loop extending outwardly from the body
25 portion wherein the linking means may be passed through the loop or secured to the protuberance.

The retaining means may be a loop portion extending

outwardly from the body portion and adapted to retain the linking means substantially in contact with an outer face of the body portion. Preferably however, the body portion includes a longitudinally extending recess for receiving the linking means and the retaining means is adapted to retain the linking means in the recess. In one form of the invention the recess is formed on an outer face of the body portion and the retaining means comprises at least one bridging portion extending across the recess to form a passage through which the linking means may pass. In another form of the invention the retaining means is provided by a complementary body portion wherein the complementary body portions cooperate to form a passageway through which the linking means may pass.

Preferably the barrier elements include attachment means for attachment of a lifting device. For example, apertures may extend through the body portion for receiving the forks of a fork lift or lifting chains. Alternatively protuberances may extend from the barrier elements for connection of such lifting devices.

Preferably the barrier elements include connecting means for connecting adjacent barrier elements together. In one form of the invention the connecting means includes connecting portions extending outwardly from the opposed ends of the body portion and adapted to engage with a complementary connecting portion extending outwardly from an abutting barrier element. In such embodiment, the engaging

portions may be secured to each other by one or more laterally extending pins. In another embodiment the connecting means is a spigot and socket connection wherein a spigot on one barrier element is slidably received in a socket of an adjacent barrier element.

Preferably the linking means is a flexible synthetic strap although other linking means such as a cable, chain or steel strap may be utilised.

In the preferred form of the invention in which the anchoring means is an aperture extending through the body portion the linking means may extend through apertures formed in adjacent barrier elements and be suitably fixed to itself by a buckle, clamp or the like. Alternatively the linking means may be permanently secured to itself by welding or the use of adhesives or the use of fasteners such as rivets.

In those embodiments wherein the anchoring means is a protuberance or the like the linking means at its opposed ends may be fixed to the protuberance.

In other forms of the invention the linking means may be threaded through the apertures of adjacent barrier elements and the ends of the linking means may be each secured to a respective anchor such as the leading or trailing barrier element or to a permanent/semi-permanent fixture such as a post thereby providing a barrier having a continuous tension member. Furthermore, a plurality of such linking means may be utilised.

In order that this invention may be more readily

understood and put into practical effect reference will now be made to the accompanying drawings which illustrate a preferred embodiment of the invention and wherein:

5 Fig. 1 is an orthographic representation of a barrier element illustrating anchoring means for linking barrier elements according to the invention.

Fig. 2a is a pictorial representation of barrier elements linked according to the invention.

10 Fig. 2b is a plan view of the linked barrier elements of Fig. 2a.

Fig. 3a is a pictorial representation of barrier elements linked by another method according to the invention.

15 Fig. 3b is a plan view of the linked barrier elements of Fig. 3a.

Fig. 4 is an orthographic representation of another barrier element according to the invention.

20 Fig. 5 is a pictorial representation of the barrier elements of Fig. 4 linked according to the invention.

Fig. 6 is an orthographic representation of a barrier element illustrating anchoring means for linking barrier elements according to the invention.

25 The barrier elements 10, 11 and 12 illustrated in Figs. 1 to 3 include a hollow body portion 13 having a stepped bottom wall 14, a top wall 16 and opposed side walls 17 and 18 adapted to contain water. The stepped bottom wall allows

the passage of water under the barrier element. Connecting portions 21 and 22 extend outwardly from opposed ends of the body portion and are integrally formed therewith. The connecting portion 22 includes an upper portion 24 and a lower portion 25 each having a substantially triangular cross-section. The upper portion 24 extends from a vertical medial plane 15 of the barrier element laterally to the wall 17 whilst the lower portion 25 extends from the medial plane to the opposed wall 18. The end portion 21 includes corresponding upper and lower portions which are oriented in the reverse positions such that they may engage with the complementary end portion 22 of an abutting barrier element. The upper and lower portions include laterally extending apertures 27 and 28 which align with corresponding apertures formed in the complementary upper and lower portions of an abutting barrier element and are adapted to receive a bolt or pin 29.

Apertures 31 and 32 extend laterally through the barrier element at a distance approximately half way between the bottom wall 14 and the top wall 16 on a plane between the apertures 27 and 28 but spaced inwardly therefrom and are adapted to receive the forks of a forklift. The apertures extend inwardly from a longitudinally extending recess 26 which provides additional structural rigidity to the barrier element and also affords protection against impact damage to the linking strap (to be described hereinafter).

Figs. 2a and 2b illustrate a method of linking barrier

elements to form a continuous barrier. A synthetic strap 33 is looped through the aperture 32 of barrier element 11 and the aperture 31 of the abutting barrier element 12 to secure the barrier elements 11 and 12 together, the portion of each barrier element between each aperture and its respective end providing an anchorage for the strap. In this embodiment the barrier elements 11 and 12 are secured by both the bolts 29 and the strap 33. However, in other embodiments wherein the barrier elements are utilised on an undulating foundation, the strap may be utilised alone or in some cases the strap and one pin only may be utilised.

The barrier elements 11, 12 and 13 illustrated in Figs. 3a and 3b are connected by the pins 29 as previously described. A strap 36 is woven through adjacent apertures 31 and 32 continuously and wherein the ends of the strap may be secured to selected barrier elements respectively such as the leading of trailing barrier element. This manner of linking the barrier elements provides a continuous tension member 36 such that an impact on one barrier element can be transmitted to many barrier elements thus minimising the risk of excessive movement of any one barrier element.

The barrier elements 10a, 11a and 12a illustrated in Fig. 4 and Fig. 5 are the same as the barrier elements of Figs. 1 to 3 in all respects except that bridging portions 41 have been provided. The bridging portions extend across the recess 25 to provide a passage 42 through which the linking strap 43 may be threaded there through or pass as

illustrated in Fig. 5. The ends of the strap 43 may be attached to respective anchorages as previously described.

The barrier elements 10b, 11b and 12b illustrated in Fig. 6 are the same as the barrier elements of Figs. 1 to 3 in many respects. Each of these elements is constituted by two half elements 44 and 45 having substantially planar inner faces 46 and 47 respectively which abut each other along the medial plane 15. Opposed recesses 49 similar to the recess 15 previously described in relation to Fig. 1 extends longitudinally across the faces 46 and 47 and together form a passage 51 for receiving a linking strap therein.

In order to construct a barrier utilising the barrier elements of Fig. 6 a linking strap such as linking strap 43 is tensioned between two spaced apart anchorages. One half element 44 of barrier elements 10b, 11b and 12b etc are then placed against the strap which is received in the recess 49. Subsequently the other half element 45 is placed against the half element 44 such that the strap is housed in the resulting passage 51 and the half elements are then secured together by bolts 29 as previously described.

It will of course be realised that the above has been given only by way of illustrative example of the invention and that all such modifications and variations thereto as would be apparent to persons skilled in the art are deemed to fall within the broad scope and ambit of the invention as is herein set forth in the appended claims.

1. A barrier including:

a plurality of linked barrier elements, each barrier element having a body portion with one or more associated anchoring means; and

5 linking means extending between anchoring means of adjacent barrier elements so as to secure said barrier elements together to form a continuous barrier.

2. A barrier as claimed in claim 1, wherein said linking means is a flexible line member.

10 3. A barrier as claimed in claim 2, wherein said linking means is a strap.

4. A barrier as claimed in any one of the preceding claims wherein said anchoring means is an aperture which extends through said body portion and said linking means may extend
15 through said aperture.

5. A barrier as claimed in any one of claims 1 to 3, wherein said anchoring means is a loop like protuberance extending outwardly from said body portion and said linking means may extend through said aperture.

20 6. A barrier as claimed in any one of the preceding claims, wherein the linking means extends through anchoring means of adjacent barrier elements and is suitably fixed to itself so

as to form a closed loop.

7. A barrier as claimed in any one of claims 1 to 5,
wherein said linking means is woven through anchoring means
of adjacent barrier elements and wherein the ends of the
5 linking means are each secured to a respective anchor.

8. A barrier as claimed in any one of the preceding claims,
wherein each said barrier element may include retaining means
provided in said body portion or attached to said body
portion for retaining said linking means in operative
10 engagement with a longitudinally extending portion of said
body portion.

9. A barrier as claimed in claim 9, wherein said body
portion includes a longitudinally extending recess for
receiving said linking means and said retaining means is
15 adapted to retain said linking means in said recess.

10. A method of linking barrier elements together so as to
construct a barrier of the type defined in claims 1 to 9,
including;

providing a plurality of barrier elements having a body
20 portion with one or more associated anchoring means;

arranging the barrier elements end to end;

looping linking means around adjacent anchoring means of
said end to end barrier elements; and

securing the respective ends together of each of said linking means.

11. A method of linking barrier elements together so as to construct a barrier of the type defined in claims 1 to 9,

5 including:

providing a plurality of barrier elements having a body portion with one or more associated anchoring means;

arranging the barrier elements end to end;

10 threading linking means progressively through the anchoring means of said plurality of barrier elements; and

securing each of the ends of said linking means to a respective anchor.

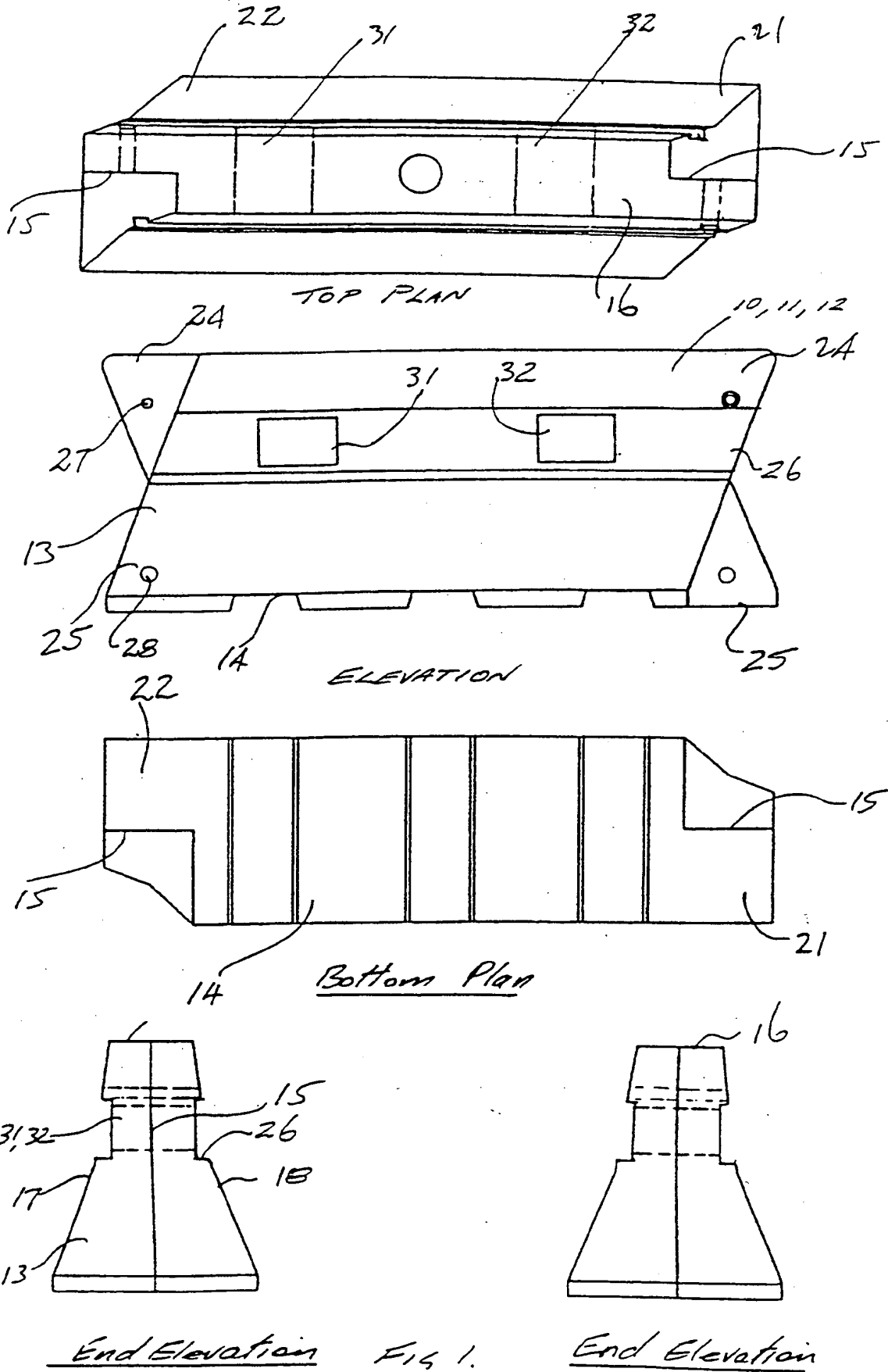
12. A barrier element adapted for linking to an adjacent barrier element by linking means such as a flexible line

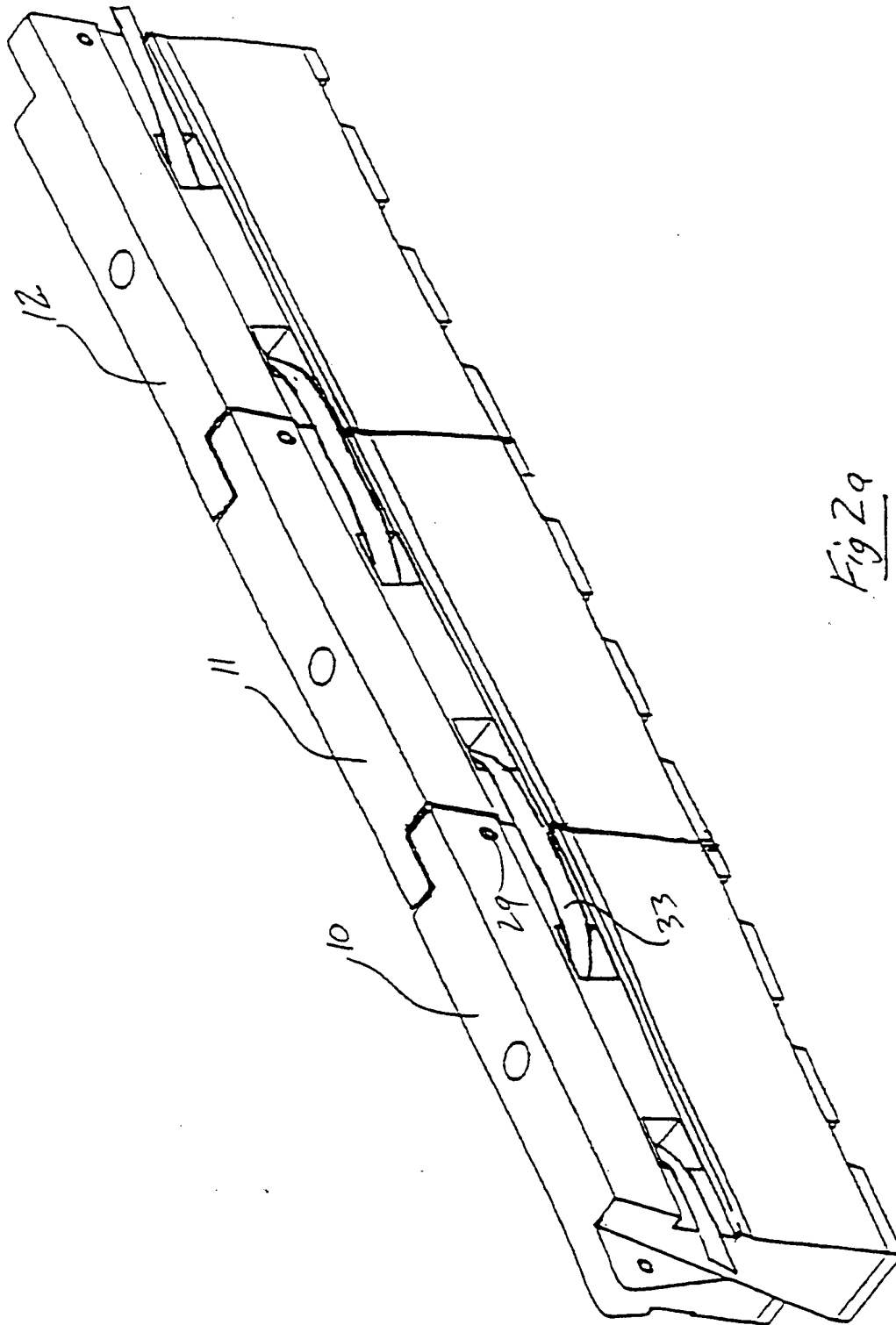
15 member including:

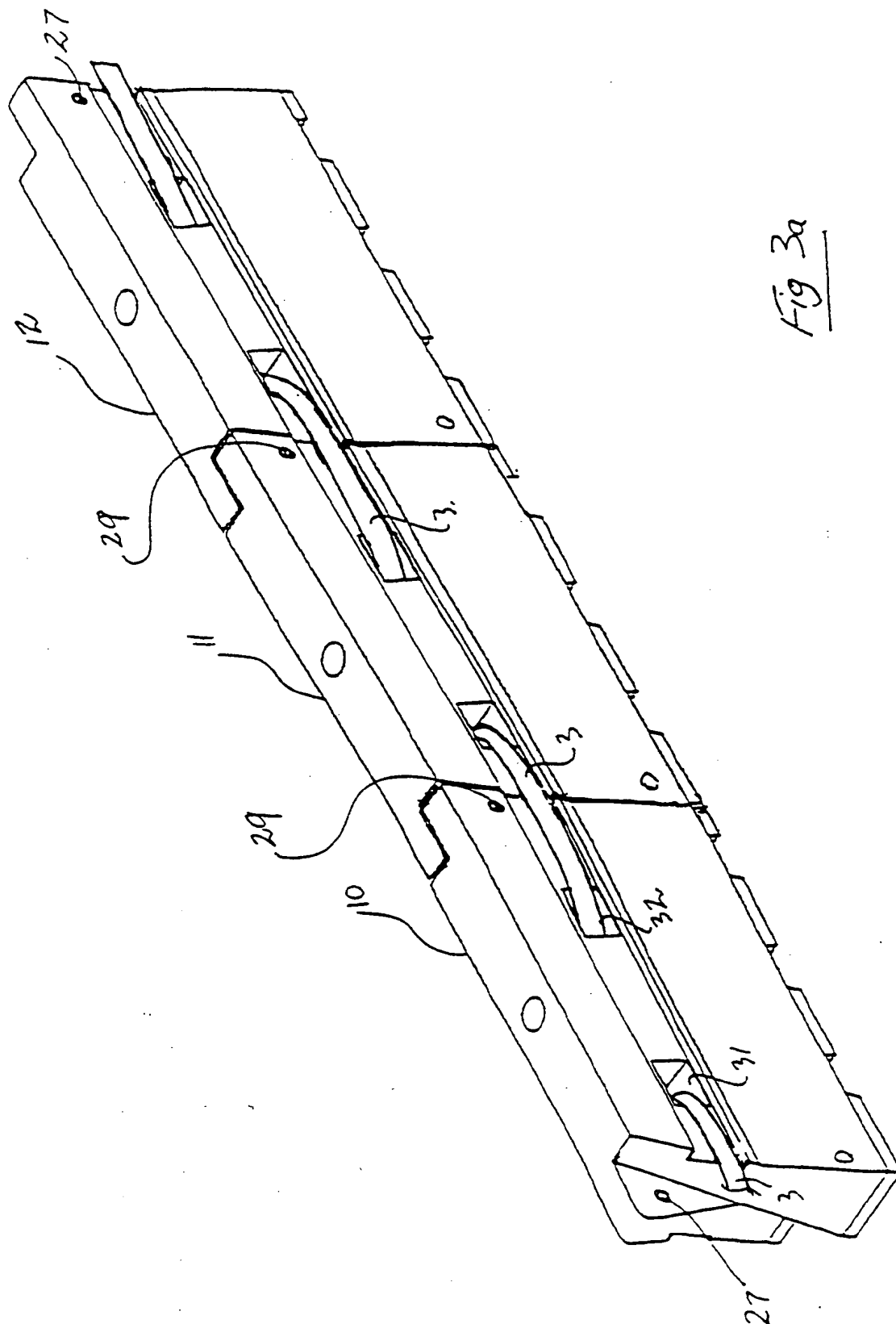
a body portion, and

retaining means provided in said body portion or attached to said body portion for retaining said linking means in operative engagement with a longitudinally extending
20 portion of said body portion whereby said barrier elements may be linked to form a continuous barrier.

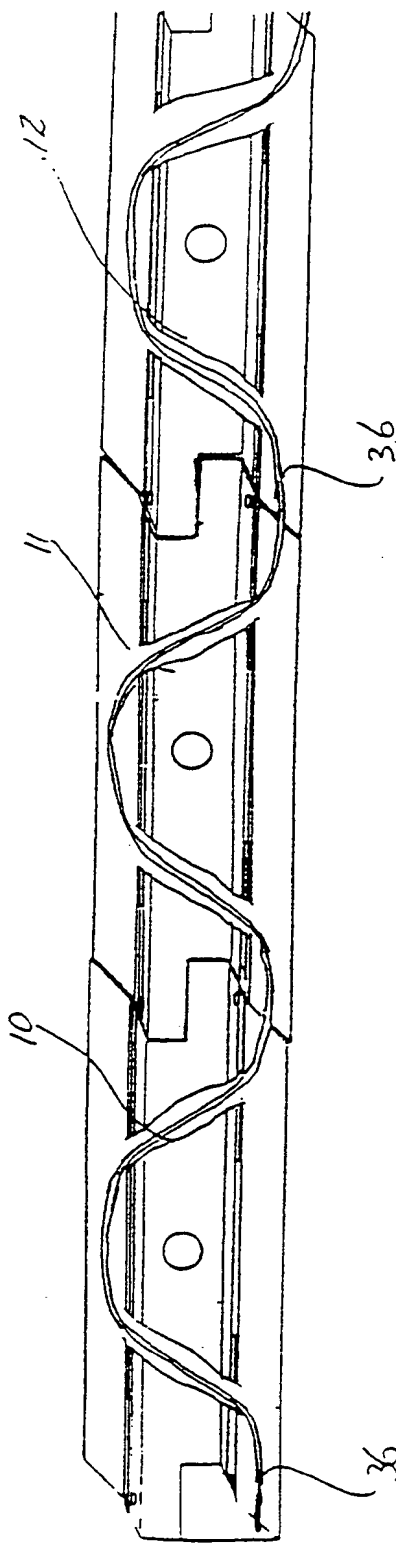
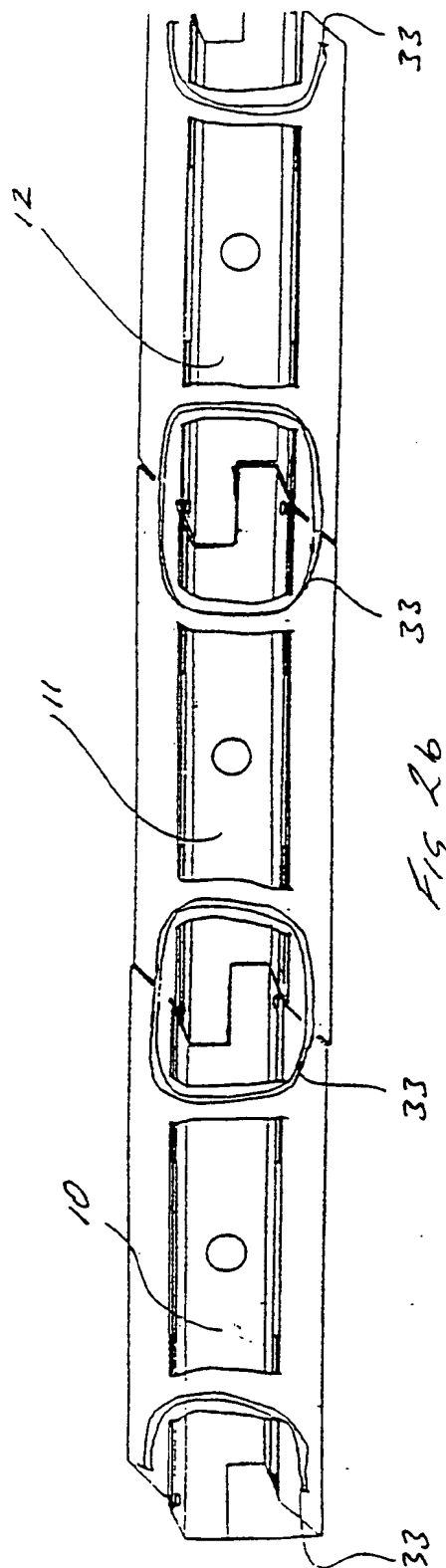
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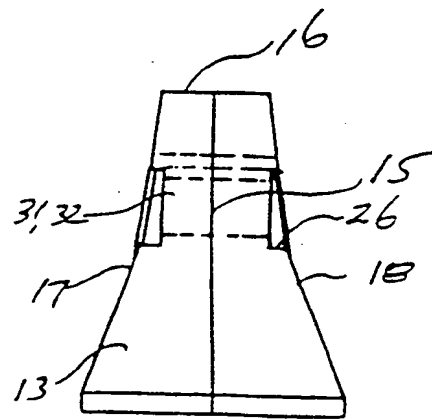
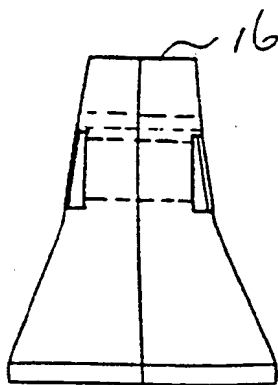
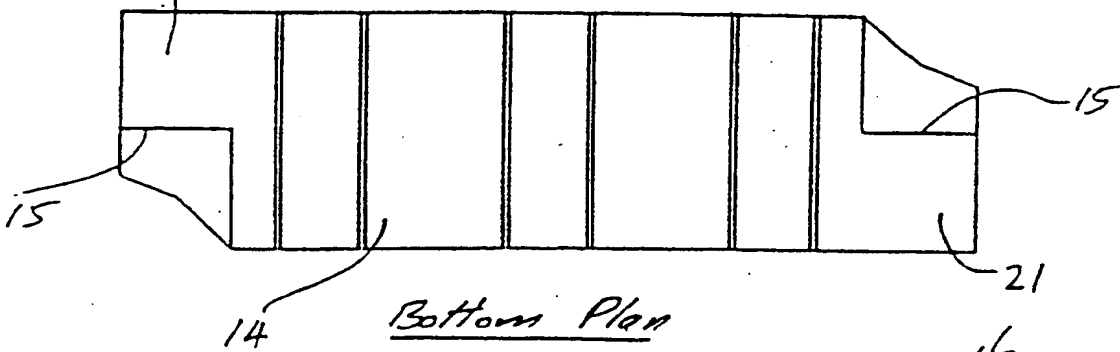
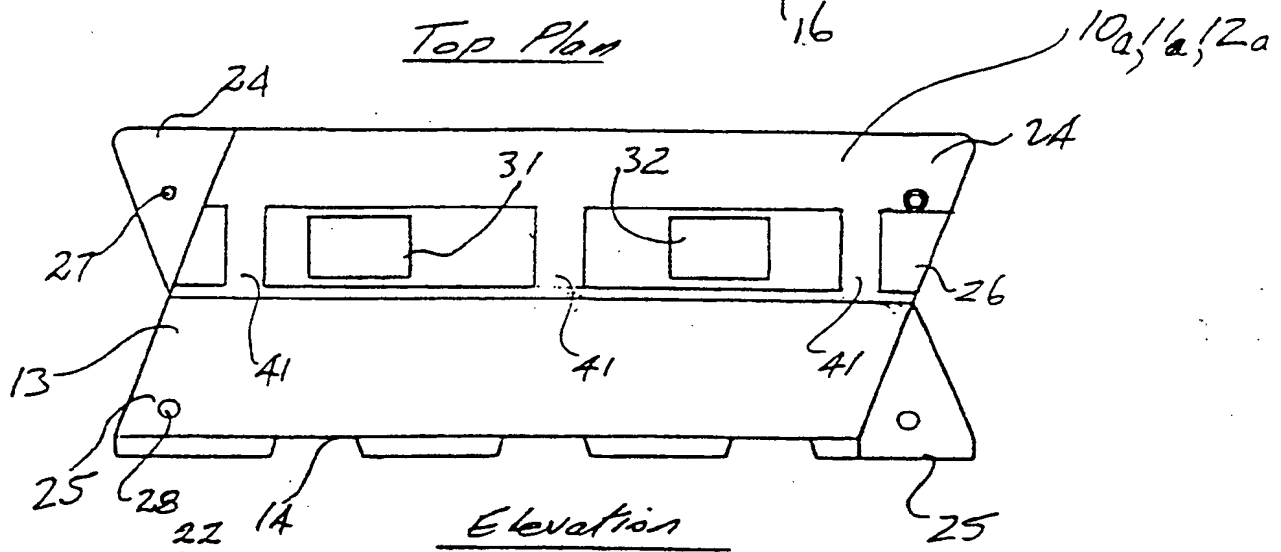
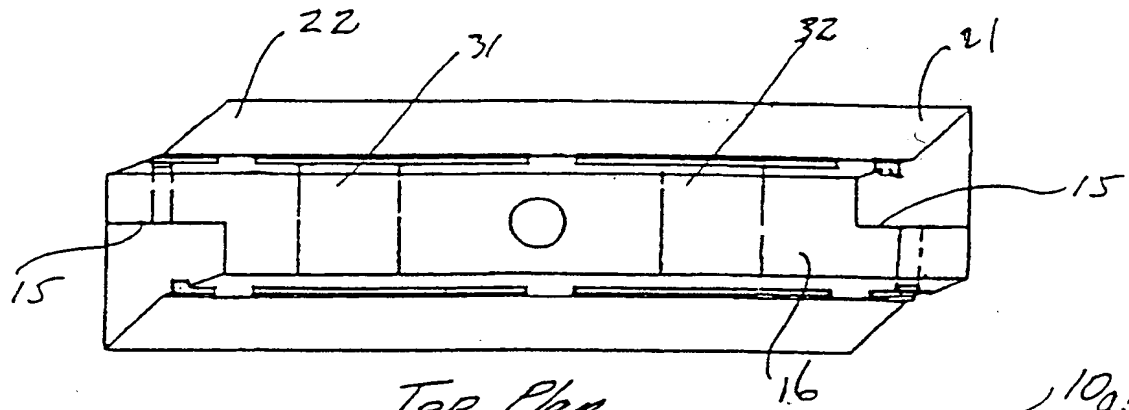


FIG 4.

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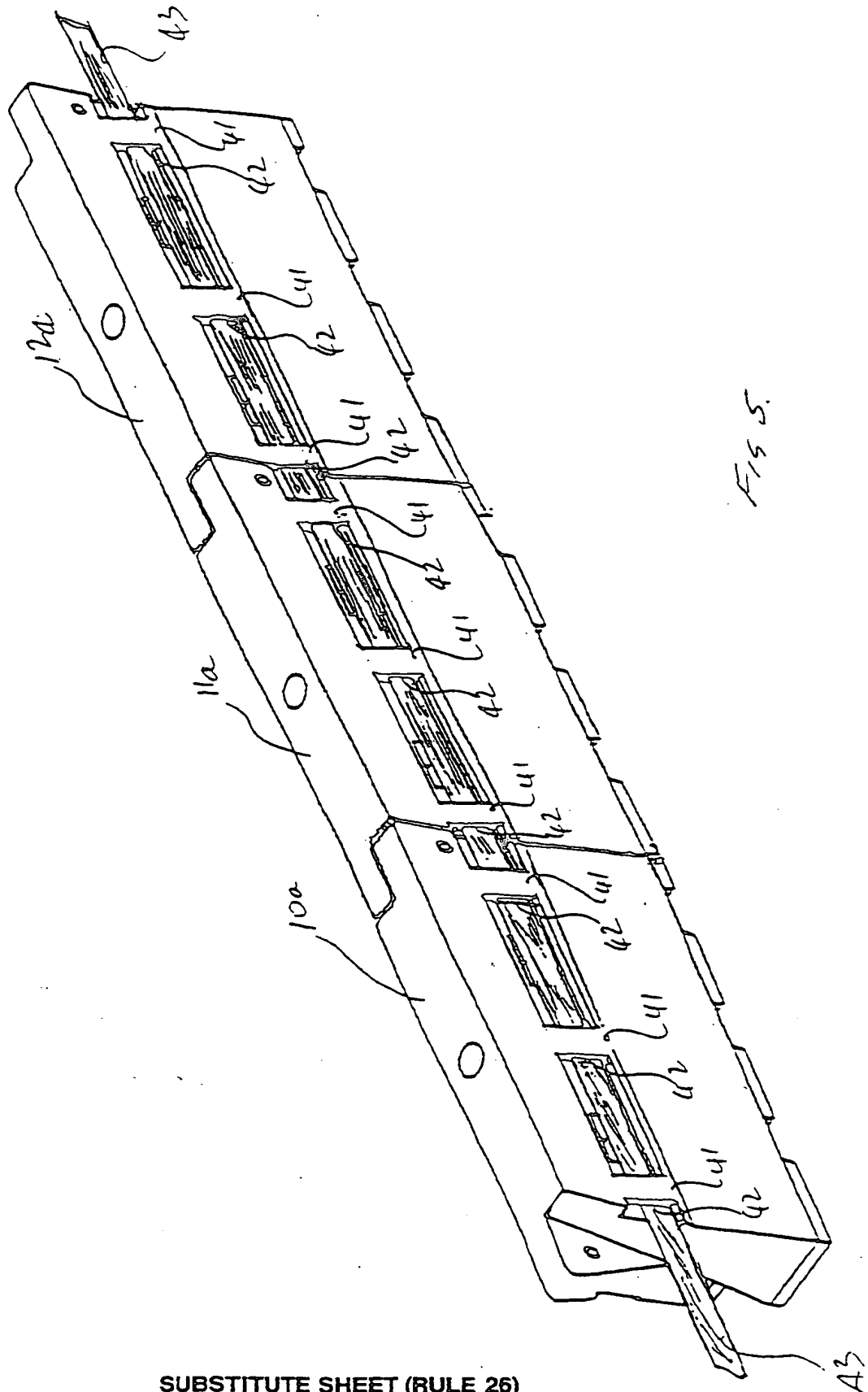
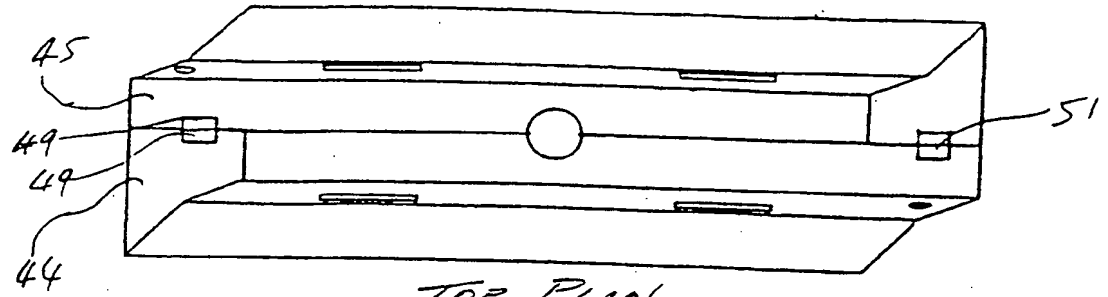


FIG. 5.

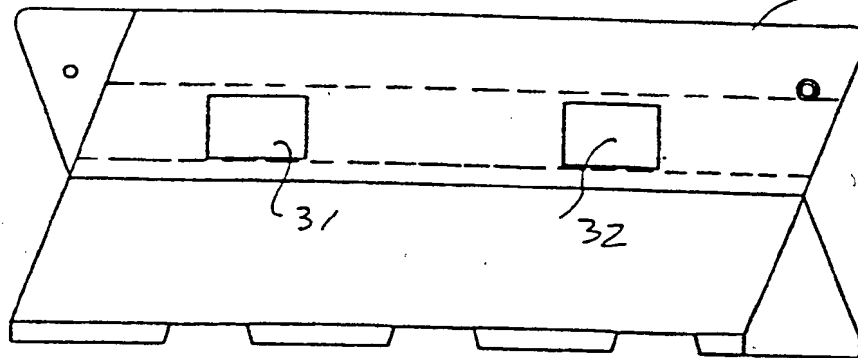
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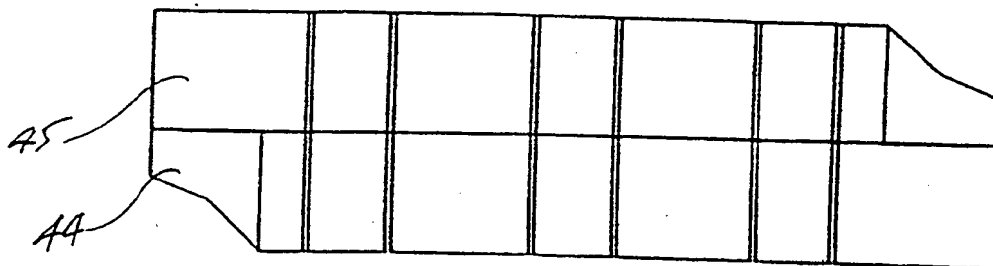


TOP PLAN

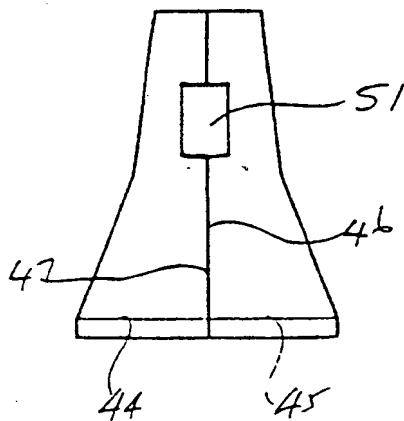
10b, 11b, 12b



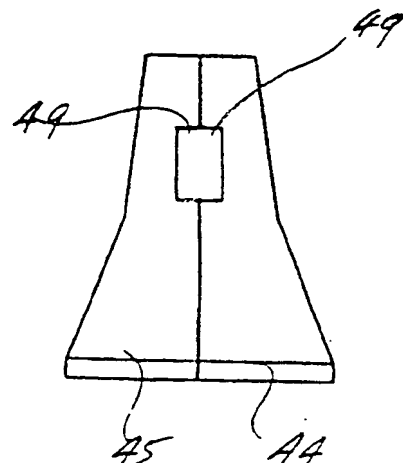
ELEVATION



BOTTOM PLAN



END ELEVATION



END ELEVATION

FIG 6.

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INTERNATIONAL SEARCH REPORT

International Application No.
PCT/AU 96/00551

A. CLASSIFICATION OF SUBJECT MATTER

Int Cl⁰: E01F 15/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC E01F 15/00 15/08

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
AU : IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
WPAT : joining or linking or connecting or coupling

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 1272588 A (BRITISH ROPES LTD) 3 May 1972 Fig. 10	1-12
X	US 2172919 A (WERTMAN) 12 September 1939 Fig. 1	1-12
X	CH 641860 A (IGECO S.A.) 15 March 1984 Fig. 1	1-12

☒ Further documents are listed in the continuation of Box C

☒ See patent family annex

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Date of the actual completion of the international search
6 November 1996

Date of mailing of the international search report

13 Nov 1996

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INTERNATIONAL SEARCH REPORT

International Application No.

PCT/AU 96/00551

C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 2702500 A (FREYSSINET INTERNATIONAL ET CIE) 16 September 1994 Fig. 1	1-12
X	US 2337626 A (SAWYER) 28 December 1943 Fig. 1.2	1-12
X	GB 1031111 A (ABERDEEN CONCRETE CO. LTD) 25 May 1966 Fig. 1	1-12
X	DE 1658664 A (GUBELA) 10 December 1970 Fig. 3	1-12
X	DE 1963458 A (FISCHER) 24 June 1971 Fig 4	1-12
X	DE 1534470 A (AUTOSTRADE CONZESSIONI E COSTRUZIONI AUTOSTRADE S.p.A.) 17 April 1969 Fig 1	1-12
X	US 5387049 A (DUCKETT) 7 February 1995 Fig. 1.2	1-12

International Application No.
PCT/AU 96/00551

Patent Document Cited in Search Report		Patent Family Member	
FR	2702500	EP	687774

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END OF ANNEX